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EXAMINER

WHALEN, DANIEL B

ART UNIT

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2829

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/592,006	Applicant(s) OHNO ET AL.	
	Examiner DANIEL WHALEN	Art Unit 2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-18 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>09/07/2006, 11/18/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Claims 13-16 and 18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claims, there being no allowable generic or linking claim. Applicant's election **without** traverse of claims 1, 3-12, and 17 in the reply filed on 10/29/2009 is acknowledged. However, it is noted that claim 17, which depends from claim 16, should be withdrawn along with device claims as it is a device claim that is misguided by its preamble reciting "method". Furthermore, the subject matter discussed in claim 17 is recited in claim 11. Therefore, claim 17 is withdrawn and currently claims 1 and 3-12 are pending.

Drawings

The drawings are objected to because reference number "105" in fig. 6(a) and 7 is used for a joining material film 5. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several

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views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 1 and 3-12 are objected to because of the following informalities: For instance, in claim 1, "a semiconductor substrate (element substrate)" in line 4 and "a film of joining material (joining material film)" in line 14 should be read -- a semiconductor substrate -- and -- a joining material film --, respectively. Claims 3-12, which depend from claim 1, are also objected. In claim 7, "thickness of a light-emitting layer" in line 2 and "said element substrate" in lines 3-4 should be read -- a thickness of the light emitting layer -- and -- said semiconductor substrate --, respectively. In claim 12, "depth" in line 2 should be read -- a depth --. Furthermore, Applicant's cooperation is requested in correcting any errors of which applicant may become aware in claims 1 and 3-12. Appropriate correction is required.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. **Claims 3-6** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. For instance, in claim 3, the recitation of “in advance” renders claim indefinite since it is not clear what method step the joining material film is formed in advance.

3. The term "higher" in **claim 5** is a relative term which renders the claim indefinite. The term "higher" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1, 3-9 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Oshio et al. (US 6,274,890 B1; hereinafter “Oshio”) in view of Hasebe et al. (US 2002/0084518 A1; hereinafter “Hasebe”).

6. **Re Claim 1**, Oshio teaches a method for producing a light-emitting device comprising:

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a step of electrically connecting a first electrode (either n-type or p-type electrode connecting with lead 21) provided on a light-emitting layer (not shown) of a light-emitting element (1, semiconductor light emitting element), wherein said light-emitting layer is provided on one of the main surface of a semiconductor substrate (not shown), and a first lead (21) of a lead frame (21,22), so as to oppose each other (fig. 5(2));

a step of electrically connecting (wire bonding) a second electrode (the other electrical type of the light emitting element connecting with lead 22) provided on the rear surface of a surface provided with the light-emitting layer of said element substrate, and a second lead (22) of said lead frame (21,22) (fig. 1 & 5(3));

a step of encapsulating a connecting part of said first electrode and said first lead, and said second electrode, and an electrode part of the second lead, with a translucent resin (5, light-transmissive resin encapsulating element) (fig. 1 & 5(4) & col. 5, lines 61-65); and

a step of producing a discrete piece by cutting said first lead and the second lead from said lead frame (fig. 5(8));

characterized in that a joining material film (3) made of an alloy or a single metal (Ag paste), is formed on the first electrode of said light-emitting element (fig. 5(2)).

Although Oshio does not explicitly disclose the light-emitting layer and the semiconductor substrate, one of ordinary skill in the art would easily recognize that the light emitting element comprises the light-emitting layer that has an n-type region and a p-type region with an active layer in between the n-type region and the p-type region on

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the semiconductor substrate as a predictable light emitting element structure to emit a light.

However, Oshio does not explicitly disclose a pattern to reduce spreading of said joining material is formed on an element mounting part of said first lead, in advance of the step of electrically connecting the first electrode of said light-emitting element and said first lead. Hasebe teaches a light emitting device, wherein the pattern (20) to reduce spreading of said joining material (Ag paste) is formed on an element mounting part (4) of said first lead (41), in advance of the step of electrically connecting the first electrode of said light-emitting element and said first lead (fig. 10 & 15) in order to prevent bleeding of the joining material to the wire connection areas (paragraph 85). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of Oshio with that of Hasebe so as to prevent bleeding of the joining material to the wire connection areas.

Re Claims 3-6, combined teaching of Oshio and Hasebe has been discussed above including surface mounting the light emitting device to a mounting substrate by adhesive such as solder (Hasebe, fig. 6 & paragraph 92) except that the joining material film is gold-tin alloy formed by plating and has a higher melting point than the melting point of a joining material used in surface mounting the light-emitting device. Nevertheless, gold-tin alloy and/or tin-lead alloy is a readily available material as an adhesive solder for mounting the device to the leadframe or to the mounting substrate and plating method is a well known semiconductor fabrication process so as to effectively deposit the desired layer such as the adhesive layer to the predetermined

area. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that the joining material film is the gold-tin alloy formed by plating method to effectively deposit the joining material film with the readily available semiconductor fabrication deposition method to obtain a predictable result.

It is noted that, regarding higher temperature discussed in claim 5, examiner interpreted that the gold-tin alloy, which is the same material choice, as a joining material has a higher melting point than the melting point of a joining material such as tin-lead alloy, which is also the same material choice, for surface mounting the light emitting device.

Re Claim 7, although the combined teaching of Oshio and Hasebe does not explicitly disclose that a thickness of the light emitting layer is sufficiently smaller compared with a thickness of the semiconductor substrate, it has held that discovering an optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Furthermore, if the only difference between the prior art and the claims is a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not performed different than the prior art device, the claimed device is not patentable distinct from the prior art device: *In re Gardner v. TEC Systems, Inc.*, 220 USPQ 777.

Re Claim 8, Hasebe teaches that a pattern of said lead frame consists of a pattern with a plurality of grooves (20) crossing mutually inside a joining area wherein the first electrode of said light-emitting element is placed (fig. 18).

Re Claim 9, Hasebe teaches that said plurality of grooves extend outside said joining area, or crossing with other grooves extending outside said joining area (fig. 18).

Re Claim 12, Hasebe teaches that depth of said grooves or height of said convex portions is larger than thickness of the joining material film formed on the first electrode of said light-emitting element (fig. 18). Furthermore, depth of the grooves would be adjusted accordingly such that the depth of the grooves is larger than the thickness of the joining material film in order to prevent the bleeding of the joining material film into the wire connection areas.

7. **Claims 1 and 10-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Oshio et al. (US 6,274,890 B1; hereinafter "Oshio") in view of Tsutsui (JP 2001352100, published on 12/21/2001).

8. **Re Claim 1**, Oshio teaches a method for producing a light-emitting device comprising:

a step of electrically connecting a first electrode (either n-type or p-type electrode connecting with lead 21) provided on a light-emitting layer (not shown) of a light-emitting element (1, semiconductor light emitting element), wherein said light-emitting layer is provided on one of the main surface of a semiconductor substrate (not shown), and a first lead (21) of a lead frame (21,22), so as to oppose each other (fig. 5(2));

a step of electrically connecting (wire bonding) a second electrode (the other electrical type of the light emitting element connecting with lead 22) provided on the rear

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surface of a surface provided with the light-emitting layer of said element substrate, and a second lead (22) of said lead frame (21,22) (fig. 1 & 5(3));

a step of encapsulating a connecting part of said first electrode and said first lead, and said second electrode, and an electrode part of the second lead, with a translucent resin (5, light-transmissive resin encapsulating element) (fig. 1 & 5(4) & col. 5, lines 61-65); and

a step of producing a discrete piece by cutting said first lead and the second lead from said lead frame (fig. 5(8));

characterized in that a joining material film (3) made of an alloy or a single metal (Ag paste), is formed on the first electrode of said light-emitting element (fig. 5(2)).

Although Oshio does not explicitly disclose the light-emitting layer and the semiconductor substrate, one of ordinary skill in the art would easily recognize that the light emitting element comprises the light-emitting layer that has an n-type region and a p-type region with an active layer in between the n-type region and the p-type region on the semiconductor substrate as a predictable light emitting element structure to emit a light.

However, Oshio does not explicitly disclose a pattern to reduce spreading of said joining material is formed on an element mounting part of said first lead, in advance of the step of electrically connecting the first electrode of said light-emitting element and said first lead. Tsutsui teaches a LED, wherein the pattern (2c) to reduce spreading of said joining material (bonding agent) is formed on an element mounting part (2a) of said first lead (2), in advance of the step of electrically connecting the first electrode of said

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light-emitting element and said first lead (fig. 1-3) in order to avoid the LED chip being buried into the bonding agent and the bonding agent forming on the side of the LED chip (paragraph 17). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of Oshio with that of Tsutsui so as to avoid the LED chip being buried into the bonding agent and the bonding agent forming on the side of the LED chip

Re Claim 10, Tsutsui teaches that a pattern of said lead frame consists of a pattern provided with a plurality of insular convex portions (regions adjacent to 2c) in a concave portion (2a), the entire periphery of or a part of the periphery thereof being located outside said joining area.

Re Claim 11, Tsutsui teaches that the upper surfaces of said insular convex portions are flat (fig. 1a).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fujiwara et al. (JP 05-063242).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL WHALEN whose telephone number is (571)270-3418. The examiner can normally be reached on Monday-Friday, 7:30am to 5:00pm, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ha Nguyen can be reached on (571) 272-1678. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. W./
Examiner, Art Unit 2829
01/13/2010

Daniel Whalen

/Ha T. Nguyen/
Supervisory Patent Examiner, Art Unit 2829